

AMENDMENTS TO THE CLAIMS

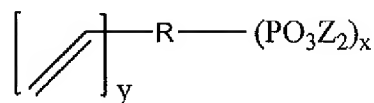
1-15 (Cancelled)

16. (Previously presented) A proton-conducting polymer membrane based on polyvinylphosphonic acid obtained by a process comprising the steps:
- a) mixing a polymer and a vinyl-containing phosphonic acid,
 - b) forming a two-dimensional structure using the mixture of step a) on a carrier, and
 - c) polymerizing the vinyl-containing phosphonic acid present in the two-dimensional structure of step b), thereby producing a polymer interpenetrating network (IPN)

wherein the membrane has a thickness in the range from 15 μm to 1000 μm ,
wherein the product obtained in step (a) includes at least 10% by weight of vinyl-containing phosphonic acid; and

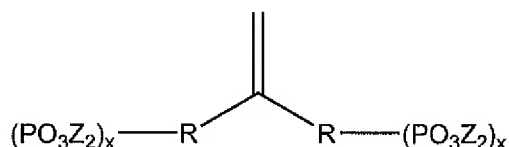
wherein the intrinsic conductivity of the proton-conducting polymer membrane at temperatures of 160°C is at least 0.001 S/cm.

17. (Previously Presented) The membrane of Claim 16, characterized in that the polymer used in step a) is a high temperature-stable polymer that contains at least one nitrogen, oxygen, or sulfur atom in a repeating unit or in different repeating units.
18. (Previously Presented) The membrane of Claim 16, characterized in that one or more polyazoles or polysulfones are used in step a).
19. (Previously Presented) The membrane of Claim 16, characterized in that the mixture produced in step a) contains compounds of the formula
wherein



R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ-,

Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN,
 x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, and
 y is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or
 the formula

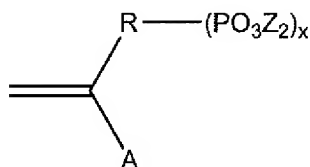


wherein

R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ₂,

Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN,
 and

x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or
 the formula



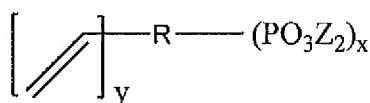
wherein

A represents a group of the formulae COOR², CN, CONR₂², OR² or R², wherein R² denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN and NZ₂,

R denotes a bond, a double bond C1-C15 alkylene group, C1-C15 alkyleneoxy group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ₂,

Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN, and x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.

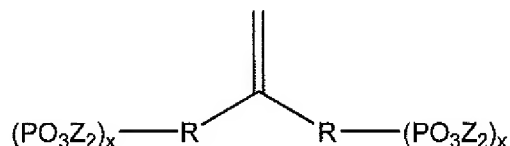
20. (Previously Presented) The membrane of Claim 16, characterize in that the mixture prepared in step a) contains monomers capable of undergoing crosslinking.
21. (Previously Presented) The membrane of Claim 16, characterized in that the polymerization in step c) is effected by a substance that is capable of forming free radicals.
22. (Cancelled)
23. (Cancelled)
24. (Previously presented) The membrane of Claim 16, characterized in that the membrane contains between 0.5 and 80 wt.% of the polymer and between 99.5 and 10 wt.% of polyvinylphosphonic acid.
25. (Previously Presented) The membrane of Claim 16, characterized in that the membrane comprises a layer containing a catalytically active component.
26. (Withdrawn) A mixture containing:
a vinyl-containing phosphonic acid having the formula



wherein

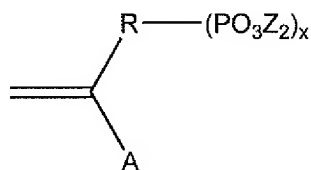
R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ_2 ,

- Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN,
- x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, and
- y is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or
- the formula



wherein

- R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ₂,
- Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN, and
- x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or
- the formula



wherein

- A represents a group of the formulae COOR², CN, CONR²₂, OR² or R², wherein R² denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN and NZ₂,

R denotes a bond, a double bond C1-C15 alkylene group, C1-C15 alkyleneoxy group, wherein the above radicals are optionally substituted by halogen, -OH, -COOZ, -CN, NZ-₂,

Z independently of one another denote hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, wherein the aforementioned radicals are optionally substituted by halogen, -OH, -CN, and

x is a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10; and

at least one polymer that has a solubility of at least 1 wt.% at a temperature of 160°C and 1 bar in the vinyl-containing phosphonic acid, characterized in that the polymer is selected from polyazoles or polysulfones.

27. (Withdrawn) The mixture of Claim 26, characterized in that the mixture contains at least one monomer capable of undergoing crosslinking.

28. (Withdrawn) The mixture of Claim 26, characterized in that the mixture contains at least one starter that is capable of forming free radicals.

29. (Previously Presented)) A membrane-electrode unit containing at least one proton-conducting polymer membrane of Claim 16.

30-34. (Cancelled)

35. (Previously Presented) A fuel cell containing: one or more proton-conducting polymer membranes of Claim 16.

36. (New) The membrane of Claim 16, characterized in that the polymerization in step c) is carried out by irradiation with IR light, NIR light, UV light, β -rays, γ -rays, or electron beams.

37. (New) The membrane of Claim 16, wherein the intrinsic conductivity of the proton-conducting polymer membrane at temperatures of 160°C is at least 10 mS/cm.

38. (New) The membrane of Claim 16, wherein the intrinsic conductivity of the proton-conducting polymer membrane at temperatures of 160°C is at least 15 mS/cm.
39. (New) The membrane of Claim 16, wherein the intrinsic conductivity of the proton-conducting polymer membrane at temperatures of 160°C is at least 20 mS/cm.
40. (New) The membrane of Claim 16, wherein the product obtained in step (a) includes at least 50% by weight of vinyl-containing phosphonic acid.
41. (New) The membrane of Claim 16, wherein the product obtained in step (a) includes at least 70% by weight of vinyl-containing phosphonic acid.
42. (New) The membrane of Claim 39, wherein the product obtained in step (a) includes at least 70% by weight of vinyl-containing phosphonic acid.